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09/782,106	02/12/2001	Karl J. Bois	10006879-1	9718

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EXAMINER	
DAY, HERNG DER	

ART UNIT	PAPER NUMBER
2128	

DATE MAILED: 11/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/782,106	BOIS ET AL.	
	Examiner	Art Unit	
	Herng-der Day	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 August 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicants' Response ("Response") to Office Action dated May 19, 2005, mailed August 17, 2005, and received by PTO August 19, 2005.

1-1. Claims 1, 8, and 14 have been amended. Claims 1-20 are pending.

1-2. Claims 1-20 have been examined and rejected.

Drawings

2. The replacement drawing sheets of FIGs. 1- 6 received August 19, 2005, are acceptable. The objection to the drawings has been withdrawn.

Specification

3. The objections to the specification have been withdrawn.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 6 and 19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5-1. Claims 6 and 19 recite the limitation "modeling a skin effect resistance and a skin effect inductance using an R-L tank circuit connected to the second port" in each claim. However, no details have been disclosed in the specification regarding how to connect the R-L tank circuit to the second port when the scattering matrix has been connected to the second port already as recited in claim 1. In other words, both the R-L tank circuit and the scattering matrix are connected to the second port, for example, in parallel, has not been disclosed.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 8-11 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential step that logically amount to the method set forth in preamble of claim 8.

7-1. Claim 8 sets forth a method for "simulating a transmission line". However, the body of the claim recites no steps that would logically amount to the method for "simulating a transmission line". Claims 9-11 and 13 are rejected as being dependent on the rejected claim 8.

8. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8-1. Claim 15 recites the limitation "the reflection coefficients" in line 3 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 1-11 and 13-20 are rejected under 35 U.S.C. 101 because the inventions as disclosed in claims are directed to non-statutory subject matter.

10-1. Regarding claims 1-11 and 13-20, it appears to be directed merely to the manipulation of an abstract idea of modeling dielectric losses in a transmission line without resulting in a practical application producing a concrete, useful, and tangible result.

For subject matter to be statutory, the claimed process must be limited to a practical application of the abstract idea or mathematical algorithm in the technological arts. See Alappat, 33 F.3d at 1543, 31 USPQ2d at 1556-57 (quoting Diamond v. Diehr, 450 U.S. at 192, 209 USPQ at 10). See also Alappat 33 F.3d at 1569, 31 USPQ2d at 1578-79 (Newman, J., concurring) ("unpatentability of the principle does not defeat patentability of its practical applications") (citing O 'Reilly v. Morse, 56 U.S. (15 How.) at 114-19). A claim is limited to a practical application when the method, as claimed, produces a concrete, tangible and useful result; i.e., the method recites a step or act of producing something that is concrete, tangible and useful. See AT &T, 172 F.3d at 1358, 50 USPQ2d at 1452. Likewise, a machine claim is statutory when the machine, as claimed, produces a concrete, tangible and useful result (as in State Street, 149 F.3d at 1373, 47 USPQ2d at 1601) and/or when a specific machine is being claimed (as in Alappat, 33 F.3d at 1544, 31 USPQ2d at 1557 (in banc). For example, a computer process that simply calculates a mathematical algorithm that models noise is nonstatutory. However, a claimed process for digitally filtering noise employing the mathematical algorithm is statutory.

10-2. Regarding claims 1-11 and 13, it appears to be directed merely to generate software modules for the manipulation of an abstract idea of modeling dielectric losses in a transmission line as suggested at page 2, line 7 of the specification, "A software method is disclosed for modeling dielectric losses in transmission lines". Software per se are not statutory.

10-3. The Examiner acknowledges that even though the claims are presently considered non-statutory they are additionally rejected below over the prior art. The Examiner assumes the Applicants will amend the claims to overcome the 101 rejections and thus make the claims statutory.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 1, 3-12, 14, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al., "Computational Models of Transmission Lines with Skin Effects and Dielectric Loss", IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications, volume 41, Issue 2, pages 107-119, February 1994, in view of Applicants' assertions.

12-1. Regarding claim 1, Yu et al. disclose a method of modeling dielectric losses in a transmission line, the method comprising:

modeling a resistance, a self-inductance, and a self-capacitance for a transmission line as a lumped element circuit having a first port and a second port, where a signal is received on the

first port (Let L, R, G, C be the inductance, resistance, conductance and capacitance per unit length of a line, pages 107-108, section II, Lumped Models of Frequency-Dependent Factors); and

modeling a dielectric loss (dielectric loss, page 108, section 2.1, Model of Dielectric Loss).

Yu et al. fail to expressly disclose the modeled dielectric loss as a scattering matrix connected to the second port. Nevertheless, Yu et al. disclose the model of Y_d is simply a parallel or serial connection of the one-ports shown in Fig. 1 (page 108, left column, the last paragraph in section 2.1). Furthermore, Yu et al. disclose cascading a number of 2-port cells forms the basis of Yu's method (page 110, left column, the last paragraph in section 3.1). In other words, the one-port model of Y_d will be effectively represented as a two-port matrix by cascading.

In the specification, Applicants assert in lines 4-5 of page 4, "As used herein, an S-parameter matrix, [S], refers to any matrix used to represent a two port circuit element".

It would have been obvious to one of ordinary skills in the art at the time the invention was made to modify the teachings of Yu et al. to incorporate the Applicants' assertions to obtain the invention as specified in claim 1 because based on Applicants' assertions Yu's model of Y_d would be interpreted as a scattering matrix connected to the second port.

12-2. Regarding claim 3, Yu et al. further disclose the scattering matrix uses values that vary with a frequency of a signal transmitted via the transmission line ($Y_d(s)$, page 108, left column, section 2.1; the reference frequency, which is usually taken from the signal frequency, page 118, left column, paragraph 1).

12-3. Regarding claim 4, Yu et al. further disclose the scattering matrix uses values that are related to the dielectric constant of a material in which the transmission line is embedded (dielectric loss, page 108, section 2.1, Model of Dielectric Loss).

12-4. Regarding claim 5, Yu et al. further disclose comprising calculating the resistance, inductance, and capacitance (Example, page 117, left column, section 5.1).

12-5. Regarding claim 6, Yu et al. further disclose comprising modeling a skin effect resistance and a skin effect inductance using an R-L tank circuit connected to the second port (Model of skin effect, page 108, Fig. 2 and section 2.2).

12-6. Regarding claim 7, Yu et al. further disclose comprising modeling the dielectric losses using circuit simulation software (using our model run in SPICE, page 117, right column, paragraph 1).

12-7. Regarding claim 8, Yu et al. disclose a method for simulating a transmission line comprising:

determining a resistance of a transmission line; determining a self-inductance of the transmission line; determining a self-capacitance of the transmission line (Example, page 117, left column, section 5.1);

creating a computer model of the line as a schematic having first and second ports (the model is based on the characteristic 2-port of the line, page 107, right column, paragraph 4);

modeling the resistance as a resistor in series with an inductor that represents the self-inductance; modeling the self-capacitance as a capacitor connected to the transmission line (Let L, R, G, C be the inductance, resistance, conductance and capacitance per unit length of a line, pages 107-108, section II, Lumped Models of Frequency-Dependent Factors); and

modeling a dielectric loss (dielectric loss, page 108, section 2.1, Model of Dielectric Loss).

Yu et al. fail to expressly disclose the modeled dielectric loss as a scattering matrix connected to the second port, wherein the scattering matrix represents conductance of the transmission line across a band of frequencies. Nevertheless, Yu et al. disclose the model of $Y_d(s)$ is simply a parallel or serial connection of the one-ports shown in Fig. 1 (page 108, left column, the last paragraph in section 2.1). Furthermore, Yu et al. disclose cascading a number of 2-port cells forms the basis of Yu's method (page 110, left column, the last paragraph in section 3.1). In other words, the one-port model of Y_d will be effectively represented as a two-port matrix by cascading.

In the specification, Applicants assert in lines 4-5 of page 4, "As used herein, an S-parameter matrix, [S], refers to any matrix used to represent a two port circuit element".

It would have been obvious to one of ordinary skills in the art at the time the invention was made to modify the teachings of Yu et al. to incorporate the Applicants' assertions to obtain the invention as specified in claim 8 because based on Applicants' assertions Yu's model of $Y_d(s)$ would be interpreted as a scattering matrix connected to the second port.

12-8. Regarding claim 9, Yu et al. further disclose comprising modeling a signal received on the first port (source signal, page 117, left column, the second paragraph in section 5.1).

12-9. Regarding claim 10, Yu et al. further disclose the scattering matrix uses values that are related to the dielectric constant of a material in which the transmission line is embedded (dielectric loss, page 108, section 2.1, Model of Dielectric Loss).

12-10. Regarding claim 11, Yu et al. further disclose the transmission line is a line on an electronic circuit board or an integrated circuit chip (VLSI design, page 118, left column, paragraph 1).

12-11. Regarding claim 12, Yu et al. further disclose the transmission line is simulated using circuit simulation software (using our model run in SPICE, page 117, right column, paragraph 1).

12-12. Regarding claims 14, 16, 17, and 19, these medium claims include equivalent method limitations as in claims 1, 3, 4, and 6 and are unpatentable using the same analysis of claims 1, 3, 4, and 6.

12-13. Regarding claim 18, this medium claim include equivalent method limitations as in claims 5 and 7 and are unpatentable using the same analysis of claims 5 and 7.

13. Claims 2 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Yu et al., "Computational Models of Transmission Lines with Skin Effects and Dielectric Loss", IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications, volume 41, Issue 2, February 1994, pages 107-119, and Applicants' assertions, and further in view of Maio et al. "Influence of the Line Characterization on the Transient Analysis of Nonlinearly Loaded Lossy Transmission Lines", IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications, volume 41, Issue 3, Mar 1994, pages 197-209.

13-1. Regarding claim 2, Yu et al. disclose a method for simulating a transmission line in claim 1. Yu et al. fail to expressly disclose the scattering matrix uses values based upon a low-loss condition wherein the intrinsic impedance of the line is unaffected by losses, whereby reflection coefficients for the first and second ports are defined to be zero if the scattering matrix is normalized to the intrinsic impedance.

Maio et al. disclose the line losses affect the choice of the reference impedance to be used in the definition of the scattering parameters (page 198, left column, paragraph 1). For example, the optimum characterization of low-loss lines is therefore defined by $Z_r = Z_o$, leading to $s_{11r} = 0$, $s_{21r} = h(t)$ (page 201, left column, paragraph 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Yu et al. to incorporate the teachings of Maio et al. to obtain the invention as specified in claim 2 because, as suggested by Maio et al., the line losses affect the choice of the reference impedance to be used in the definition of the scattering parameters (page 198, left column, paragraph 1).

13-2. Regarding claim 15, this medium claim include equivalent method limitations as in claim 2 and are unpatentable using the same analysis of claim 2.

Applicants' Arguments

14. Applicants argue the following:

14-1. Rejection of claims 6 and 19 Under 35 U.S.C. §112, First Paragraph

(1) "The applicant notes that the R-L tank is shown in Fig. 3 and described at page 3, lines 20-22 of the specification. Therefore, the R-L tank is disclosed and the rejection has been overcome" (page 8, paragraph 6 through page 9, paragraph 1, Response).

14-2. Rejection of claim 15 Under 35 U.S.C. §112, Second Paragraph

(2) "Because reflection coefficients are inherently part of scattering matrices, the applicants contend that the rejection has been overcome" (page 9, paragraph 3, Response).

14-3. Rejection of claims 1-13 Under 35 U.S.C. §101

(3) "The modeling allows the transmission line characteristics to be determined before a transmission line is built" (page 10, paragraph 3, Response).

(4) "there is no criteria against patentability based on an invention that is able to be practiced using pencil and paper" (page 10, paragraph 3, Response).

14-4. Rejection of claims 1, 3-12, 14, and 16-19 Under 35 U.S.C. §103(a)

(5) "The applicants agree that page 4, lines 4-5 states that a scattering matrix refers to any matrix used to represent a two port circuit element. Lines 6-7 further state that the scattering matrix relates to the voltage waves incident on the ports to those reflected from the ports" (page 12, paragraph 3, Response).

(6) "Yu does not disclose any cascading related to Y_d. Accordingly, any cascading disclosed in Yu would not be applicable to converting Y_d to a two-port device as claimed in claim 1" (page 12, paragraph 5, Response).

Response to Arguments

15. Applicants' arguments have been fully considered.

15-1. Applicants' argument (1) is not persuasive. Although the R-L tank has been shown in Fig. 3 and described at page 3, lines 20-22 of the specification, no details have been disclosed in the specification regarding how to connect the R-L tank circuit to the second port when the scattering matrix has been connected to the second port already as recited in claim 1. In other words, both the R-L tank circuit and the scattering matrix are connected to the second port, for example, in parallel, has not been disclosed.

15-2. Applicants' argument (2) is not persuasive. As described at page 4, lines 4-11 of the specification, the scattering matrix **may** be shown in the form [S] and in the example shown, S_{11} and S_{22} are reflection coefficients at ports 1 and 2. Therefore, the argument of inherence is not persuasive.

15-3. Applicants' argument (3) is not persuasive. For example, based on the further recited limitation in claim 5, "calculating the resistance, inductance, and capacitance", claim 1 is obviously manipulating of an abstract idea of modeling dielectric losses in a transmission line without even calculating each element. In other words, without simulating or executing the transmission line model, the claimed modeling steps cannot allow the transmission line characteristics to be determined.

15-4. Response to Applicants' argument (4). Statutory will not be determined based solely on an invention that is able to be practiced using pencil and paper. The inventions as disclosed in claims 1-11 and 13-20 are directed to non-statutory subject matter because they appear to be directed merely to the manipulation of an abstract idea of modeling dielectric losses in a transmission line without resulting in a practical application producing a concrete, useful, and tangible result.

15-5. Applicants' argument (5) is not persuasive. It is noted that the features upon which applicant relies (i.e., the scattering matrix relates to the voltage waves incident on the ports to those reflected from the ports, as implicitly recited in, for example, claims 13 and 20) are not recited in the rejected claim 1. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988

F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Based on Applicants' specification at page 4, lines 4-5, a scattering matrix refers to any matrix used to represent a two port circuit element.

15-6. Applicants' argument (6) is not persuasive. Cascading is well known to one of ordinary skills in the relevant art. For example, the RC ladder shown in Fig. 2(b) is cascaded by multiple Y_d shown in Fig. 1.

Conclusion

16. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kamini S. Shah can be reached on (571) 272-2279. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day H.D.
November 14, 2005

Thai Phan
Patent Examiner
Au: 2128